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## **Estimation of cost-of-illness in patients with psoriasis in Switzerland**

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**Abstract:** **BACKGROUND:** Evaluation of the current clinical treatment of psoriasis in Switzerland remains to be measured with the parameters cost-of-illness and quality of life. **Objective:** To obtain data on out-of-pocket expenses, costs of outpatient/office-based care and inpatient care for psoriasis, and to extrapolate total costs by state of severity to the entire Swiss population. **METHODS:** 1200 retrospective surveys were distributed to patient members of the Swiss Psoriasis and Vitiligo Society, and 400 surveys to office-/hospital-based Swiss dermatologists. The reference year for data collection was 2005. Patients were stratified into three subgroups according to severity of disease. Costs of inpatient care were measured by the amount of hospital days of psoriatic patients from the Swiss Federal Hospital Statistics. **RESULTS:** 383 patient questionnaires, and 170 cases documented by 57 dermatologists were analyzed. Out-of-pocket expenses/costs for ambulatory care per patient and year ranged from CHF 600-1100 for mild psoriasis to CHF 2400-9900 for severe psoriasis. Including costs for inpatient care of approximately CHF 60 million, the total annual costs for psoriasis in Switzerland in 2004/5 amounted to approximately CHF 314-458 million. **CONCLUSIONS:** Moderate-to-severe psoriasis is associated with a significant impact on the quality of life and at least 4-fold higher costs than mild psoriasis, indicating the need for efficient control of the disease. This cost-of-illness study provides specific health economic data for future healthcare decision making, particularly with the advent of new therapeutic agents for effective psoriasis control.

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# Estimation of cost-of-illness in patients with psoriasis in Switzerland

Alexander A. Navarini<sup>a</sup>, Emanuel Laffitte<sup>b</sup>, Curdin Conrad<sup>a</sup>, Paolo Piffaretti<sup>c</sup>, Elisabeth Brock<sup>d</sup>, Stephan Ruckdaeschel<sup>d</sup>, Ralph M. Trüeb<sup>a</sup>

<sup>a</sup> Department of Dermatology, University of Zurich, Zurich, Switzerland

<sup>b</sup> Service de Dermatologie, Hôpitaux Universitaires de Genève, Switzerland

<sup>c</sup> Wyeth Pharmaceuticals AG, Zug, Switzerland

<sup>d</sup> HealthEcon AG, Basel, Switzerland

## Summary

**Background:** Evaluation of the current clinical treatment of psoriasis in Switzerland remains to be measured with the parameters cost-of-illness and quality of life.

**Objective:** To obtain data on out-of-pocket expenses, costs of outpatient/office-based care and inpatient care for psoriasis, and to extrapolate total costs by state of severity to the entire Swiss population.

**Methods:** 1200 retrospective surveys were distributed to patient members of the Swiss Psoriasis and Vitiligo Society, and 400 surveys to office-/hospital-based Swiss dermatologists. The reference year for data collection was 2005. Patients were stratified into three subgroups according to severity of disease. Costs of inpatient care were measured by the amount of hospital days of psoriatic patients from the Swiss Federal Hospital Statistics.

**Results:** 383 patient questionnaires, and 170

cases documented by 57 dermatologists were analyzed. Out-of-pocket expenses/costs for ambulatory care per patient and year ranged from CHF 600–1100 for mild psoriasis to CHF 2400–9900 for severe psoriasis. Including costs for inpatient care of approximately CHF 60 million, the total annual costs for psoriasis in Switzerland in 2004/5 amounted to approximately CHF 314–458 million.

**Conclusions:** Moderate-to-severe psoriasis is associated with a significant impact on the quality of life and at least 4-fold higher costs than mild psoriasis, indicating the need for efficient control of the disease. This cost-of-illness study provides specific health economic data for future healthcare decision making, particularly with the advent of new therapeutic agents for effective psoriasis control.

**Key words:** moderate-to-severe psoriasis; quality of life; cost-of-illness; Switzerland

## Introduction

Psoriasis is a chronic inflammatory skin disease with a substantial economic burden [1–9]. It is highly prevalent, affecting about 2% of the adult western population. The chronic, very noticeable and symptomatic skin lesions frequently result in work day loss. Discomfort, time and energy invested in treatment and the stigmatization associated with the disease have a significant adverse impact on quality of life. Due to lack of a definite cure, continuous care is often required.

As psoriasis is not a life-threatening disease, the medical and socioeconomic burdens are often underestimated by health care professionals. However, for several western countries, it has been shown that psoriasis represents a financial burden for both the affected individual and for the health care system [1–9]. According to reports from Germany [7–9], cost estimates range from about EUR 160 million [10] for inpatient treatment per year to

annual severity-related costs of EUR 2866 per patient per year for moderate psoriasis and EUR 4985 for severe psoriasis in one study [7], and mean total costs of EUR 6709 per patient per year in another study [8]. In contrast, little is known about the economic impact of psoriasis in Switzerland. Specifically, there is a lack of knowledge regarding out-of-pocket expenses and ambulatory care costs. However, both of these expenditures play an important budgetary role for psoriasis patients and their families. Thus, the present study was initiated in order to estimate the impact of psoriasis in terms of resources used, associated costs, and quality of life impairment, specifically for Switzerland. This is intended to convey a picture of the burden of the disease, which can be used in evaluations of the cost-effectiveness of specific therapies, such as new therapeutic agents for effective psoriasis control.

The study was carried out by HealthEcon Ltd, Basel, and funded by Wyeth Pharmaceuticals Ltd, Zug, Switzerland. We would particularly like to thank the participating patients and their organization, the Swiss Psoriasis and Vitiligo Society (SPVG), as well as the 57 contributing Swiss dermatologists for their cooperation in the surveys. The design, analysis and reporting of the study was performed by HealthEcon Ltd according to preset objectives unrestricted by Wyeth Pharmaceuticals Ltd and with the scientific advice of RMT. Paolo Piffaretti is a representative of Wyeth. Elisabeth Brock and Stephan Ruckdaeschel are employed by HealthEcon Ltd.

## Design and methods

### Hypothesis

1. Patients with plaque-type psoriasis in Swiss dermatological practices and outpatient clinics, as well as patient members of the Swiss Psoriasis and Vitiligo Association, show a substantial and disease activity-dependent burden of illness.

2. Direct costs of the disease rise disproportionately with disease activity.

### Design of the study

The study is a retrospective cost-of-illness analysis in relation to severity of disease. It is based on data collected through a patient survey to evaluate the impact of disease on health-related quality of Life (HRQoL) and patients' out-of-pocket expenses. In addition, a physicians' survey was performed to estimate ambulatory care costs, and inpatient data was obtained from the Federal Statistical Office (FSO) regarding the number of cases treated for psoriasis in hospital and the average length of hospital stay. Patients covered by the two surveys were not identical. The reference year for data collection for outpatients was 2005, and for inpatients 2004.

### Aim of the study

The objective of the study was to obtain data on out-of-pocket expenses, costs of outpatient/office-based care and inpatient care for psoriasis, and to extrapolate the total costs, by state of severity, to the entire Swiss population.

### Patients

A questionnaire package accompanied by cover letters and prepaid return envelopes addressed to Health Econ Ltd, Basel were distributed by the Swiss Psoriasis and Vitiligo Society (SPVG), the Swiss patient association, to its 1200 members in November 2005. SPVG added a cover letter encouraging members to participate in the study. Questionnaires and cover letters were provided in German and in French.

Physicians were issued with questionnaires for patient documentation, a cover letter and a return prepaid envelope addressed to HealthEcon Ltd. This Switzerland-wide survey only addressed dermatologists. The questionnaire and cover letter were again provided in German and in French. A total of 400 dermatologists were contacted, representing office-based physicians as well as physicians providing ambulatory care in hospitals.

### Inclusion criteria

Patients aged 18 years or more with psoriasis, independent of severity, were included in the study. Patients were enrolled by physicians if they had been treated by the participating dermatologist for at least 12 months before enrollment. Physicians were asked to document the last three psoriasis patients appearing in their office for psoriasis.

Inpatient data were obtained from the FSO regarding the number of patients with relevant ICD-10 codes (L40.0–40.9). FSO supplied the number of cases treated in hospital with a primary or secondary diagnosis of psoriasis and length of hospital stay.

Outpatients were stratified into three subgroups according to affected body surface area (BSA): mild: <2% BSA; moderate: 2–10% BSA; severe: >10% BSA.

### Data collection – patients

The patient survey was performed with a semi-structured, patient-administered questionnaire to collect individual patients' data using a "bottom-up" methodology. The questionnaire asked for patients' demographic data, duration and severity of disease including affected body areas, patients' out-of-pocket expenses for drugs, skin care products and services (including complementary treatments), privately paid hospital and inpatient treatments, as well as psoriasis-related absence from work. Patients were asked to measure the area of their plaques in amounts of their own palmar surface, a reliable method frequently used in clinical practice.

The burden of disease for the individual patient in terms of HRQoL and the disease's impact on daily activities was measured with the Dermatology Life Quality Index (DLQI) [11]. Collected data were assessed for plausibility and completeness by two experienced representatives of HealthEcon. Incompletely filled questionnaires were conservatively completed, if necessary, by applying information from patients that provided valid reports for the respective category or item of resource use. Where no plausible data, regarding treatment costs for example, could be identified based on other patients in the same survey, data was substituted based on official publications [12]. Missing data was supplemented in such a way as to underestimate costs, rather than to overestimate them. This can best be illustrated with an example: if the name of drug used was supplied but no dosage information, it was assumed that the patient used the dose used by the majority of patients who reported using the same drug. If no other patient used the same drug, it was assumed that the smallest dose was used of the possible dosage range supplied in the *Arzneimittelkompendium*. Any such changes made were tracked and do not comprise more than 20% of all the elements used to calculate costs.

### Data collection – physicians

Similar to the patient survey, data on resource use in ambulatory care were collected using a "bottom-up" approach based on a specifically developed semi-structured, self-reported questionnaire for physicians. The physician questionnaire requested information on demographics, assessment of disease severity (using the Psoriasis Area Severity Index [PASI] if available), comorbidities, drugs, medical services (including complementary treatments) and rehabilitation.

The information concerning resource consumption was retrospectively extracted from the patient's records. The documentation of drug treatment was structured according to different drug classes. Based on prescription information, the overall costs of drugs were calculated by multiplying the prescriptions with the corresponding prices. Regarding medical services, the participating dermatologists were asked to document the frequency of diagnostic and therapeutic procedures performed for the given patient, including a wide range of services from basic consultation to phototherapy, for example. Given this structural framework, the questionnaire demanded the documentation of the medical and technical services provided, the number of applications, the respective TARMED (individual outpatient service tariff) position and/or tax points. The costs of the services charged to the Swiss obligatory health insurance were calculated by multiplying frequency, tax points and tax point value. Missing data were, if necessary, conservatively supplemented in such a way as to underestimate costs, rather than to overestimate them, as described in the section "Data collection – patients" above.

### Data collection – FSO, SVK

Extracting costs for inpatient care differs from the data obtained through the patient and physician survey in that it used a “top-down” approach, instead of the “bottom-up” calculation used to estimate costs for ambulatory care and out-of-pocket expenses. The information supplied by the FSO regarding the number of cases treated in the hospital for psoriasis and the average length of stay (LOS) was translated into number of patients by using the rate “cases per patient” also supplied by the FSO. Average LOS per patient in 2004 was calculated on the number of cases per ICS-10 subgroup, the average length of stay per case, and the number of cases per patient. As all patients hospitalized with the respective diagnosis are included, the data provides a total sum of costs for inpatient care caused by patients hospitalized due to psoriasis. Costs of inpatient care calculated that way are the total costs incurring for Switzerland that year. Along with common Swiss medical practice, as a rule, only severe psoriasis cases require hospital treatment. The costs for inpatient care, as derived from FSO data, were therefore completely assigned to patients with severe psoriasis when extrapolating the costs of psoriasis for Switzerland. In 2005, 229 patients received biologic treatment for severe psoriasis. The respective costs were obtained from the “Schweizerischer Krankenkassenverband” (SVK, Swiss Medical Insurance Association).

### Costs

Patients estimated their resource use regarding OTC medication, skin care products, as well as non-reimbursed treatments. The overall cost estimate for each of the surveyed patients was calculated by multiplying the amount of units of psoriasis-related physical resources consumed by each patient with the costs per unit given by the patient or – depending on the patient’s reporting – by adding up

the total amount of expenses the patient reported to have spent for products or services in 2005. This calculation was performed differentiating for disease severity (mild, moderate, severe) and resulted in total costs for patients in the respective category of severity.

To evaluate ambulatory treatment costs as reported by physicians, the average frequency of diagnostic or treatment services was multiplied with the corresponding cost for this service. Charges for outpatient services were estimated using points published in the Swiss tariff list (TARMED). These numbers were multiplied by the average value per point based on the straight unweighted arithmetic mean of the tax point values across all cantons of Switzerland for 2005 (CHF 0.86). For laboratory tests, a national rate of CHF 1.00 per tax point was applied. TARMED positions and associated tax points were obtained from the TARMED Browser 1.2 which was valid for the year 2005. The 2005 tax point values were obtained from santésuisse’s website ([www.santesuisse.ch/datasheets/files/2006\\_02011439030.xls](http://www.santesuisse.ch/datasheets/files/2006_02011439030.xls)) in June 2006. Respective data for laboratory tests were obtained in June 2006 from the document “Analysenliste” on the website of the Swiss Ministry of Health ([www.bag.admin.ch/kv/gesetze/d/index.htm](http://www.bag.admin.ch/kv/gesetze/d/index.htm)). Drug prices were obtained from the 2005 Drug Reference Manual of Switzerland. In a similar way as for the patient survey, costs calculated in this way were added up for all patients who were reported as being given a specific drug or service in 2005 to result in total costs for all patients that reported use of this particular parameter in the respective category of disease severity (mild, moderate, severe). To estimate the costs of inpatient care, a targeted analysis of Swiss Hospital Statistics was used. Costs for inpatient care were estimated by multiplying the average LOS per patient with the average costs per hospital day. In 2005, the average costs per day in hospital amounted to approximately CHF 1070 [13].

## Results

### Patient survey

383 documented records of patients’ out-of-pocket expenses were returned (32%, comparable to other questionnaire-based studies [14]) and analysed. The majority of patients were between 30 and 65 years old, with a mean age of 55 years. 226 (59%) of the 383 patients were male. In 50% of patients, psoriasis had been diagnosed between 55 and 25 years ago and in 41% between 5 and 25 years ago. In 60% of cases, the diagnosis had been given by a dermatologist.

Using the body surface area affected as a measure for severity, 38% reported mild disease (BSA <2%), 43% moderate disease (BSA 2–10%) and 19% severe disease (BSA >10%). On average, patients reported more than seven affected body areas. The relative proportion of body areas affected is shown in table 1.

Overall, 65% of patients had been using drugs against psoriasis one month prior to filling out the questionnaire. 8% reported having been free of symptoms during the previous week. Out-of-pocket expenses relating to the category of severity are shown in table 2. This study found a considerable increase in total average out-of-pocket

expenses depending on the severity of disease from CHF 630 per patient per year in mild psoriasis to CHF 2400 in severe psoriasis. 30% of patients reported a large or very large effect of their psoriasis on quality of life, whereas two thirds indicated a small or moderate effect, and only 8% reported no effect. The greater the affected skin area, the higher the impact on the quality of life (fig. 1).

### Physician survey

170 patients were documented by 57 dermatologists. Comparable to the patient survey, the majority of patients were between 30 and 65 years old, with a mean age of 48 years. 19% of patients were diagnosed with psoriasis between 55 and 25 years ago, 58% between 25 and 5 years ago, and 18% less than 5 years ago.

Disease activity of psoriasis, documented by the dermatologists, was skewed towards higher severity compared to the patient survey: 34% were reported as severe and 22% as moderate. In 21 patients, PASI scores had been measured with the mean at 12.5. Patients indicated more involvement of nail (54% vs 31% by dermatologists),



**Table 1**

Body areas affected as reported from patient and physician survey (multiple answers were possible).

Body area affected	Results from patient survey		Results from physician survey	
	Number and proportion of patients reporting respective area (n = 383)		Number and proportion of dermatologists reporting respective area (n = 170)	
Back	193	50.40%	109	64.10%
Feet	136	35.50%	60	35.30%
Knee	244	63.70%	112	65.90%
Nails	208	54.30%	53	31.20%
Arm pits	72	18.80%	16	9.40%
Arms	221	57.70%	111	65.30%
Elbows	318	83.00%	126	74.10%
Genitals	124	32.40%	43	25.30%
Legs	275	71.80%	124	72.90%
Scalp	314	82.00%	116	68.20%
Face	130	33.90%	40	23.50%
Hands	160	41.80%	73	42.90%
Sacral bone	135	35.20%	66	38.80%
Upper part of body	167	43.60%	103	60.60%
Anal region	128	33.40%	34	20.00%

**Table 2**

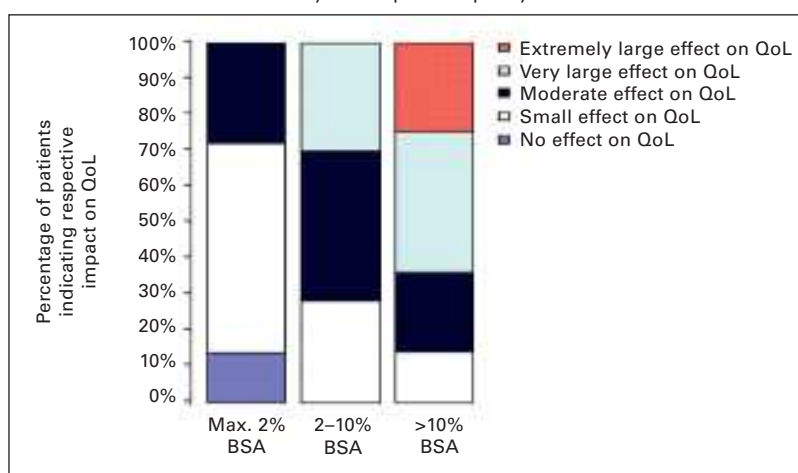
Out-of-pocket expenses per patient per year according to state of severity.

State of severity	Mild		Moderate		Severe	
	Mean costs [CHF]	Valid N	Mean costs [CHF]	Valid N	Mean costs [CHF]	Valid N
Drugs	43	(n = 21)	49	(n = 28)	330	(n = 16)
Skin care products	135	(n = 80)	216	(n = 97)	318	(n = 39)
Bathing therapy	259	(n = 26)	551	(n = 49)	888	(n = 19)
Other measures	195	(n = 32)	305	(n = 43)	906	(n = 37)
Total out-of-pocket expenses	631	(n = 143)	1122	(n = 161)	2442	(n = 71)

"Valid n" denotes the number of patients reporting valid data for any particular cost category. 16 patients with severe psoriasis reported out-of-pocket expenses for drugs in 2005. Dividing the total expenses on drugs reported by these 16 patients (in total approximately CHF 23 000; not shown in this table) by all patients with severe psoriasis (n = 71) results in the average out-of-pocket expenses of CHF 330 for drugs per patient in the severe state of disease. Without this change in denominator the respective expenses would be overestimated.

**Figure 1**

Relation between Disease severity and impact on quality of life.



scalp (82 vs 68% by dermatologists), and intertriginous (arm pits, genital, anal region) regions (19 vs 9%, 32 vs 25%, 33 vs 20%, respectively by dermatologists) than identified by the dermatologists.

The results of the physician survey show the same trend of costs rising disproportionately with disease severity: ambulatory costs range on average from CHF 1100 per patient per year for mild psoriasis, to CHF 2500 for moderate psoriasis and CHF 9900 for severe psoriasis. As expected, a relation between ambulatory costs and severity of disease was observed (table 3).

### Treatment with Biologics

In 2005, some patients with severe psoriasis received biologics, namely Enbrel (Etanercept), Amevive (Alefcept) or Raptiva (Efalizumab), resulting in total costs of CHF 2 154 547. These costs were added to the treatment cost for severe psoriasis.

### Inpatient care

Based on ICD-10 codes, a total of 3578 cases referring to 3043 patients with diagnosed psoriasis were registered in Swiss hospitals in 2004. An average LOS of 16.71 days per hospitalized male patient and 20.68 days per hospitalized female patient was reported, resulting in a weighted average LOS for men (60%) and women (40%) of 18.3 days.

Resource use is documented by the Swiss hospital statistics in terms of the average LOS in days per case. As previously mentioned, the reported 3578 cases corresponded to 3043 patients in 2004. Based on a weighted average LOS of 18.3 days and average costs for one hospital day of approximately CHF 1070 [12], the costs of inpatient care amounts to approximately CHF 17 800 per year for a male and CHF 22 100 per year for a female patient hospitalized for psoriasis.

### Extrapolating total direct costs of moderate-to-severe psoriasis for Switzerland

Total costs of psoriasis for Switzerland were estimated for an estimated adult population of 5.8 million, based on the numbers reported by the SFO. Assuming a conservative overall prevalence rate of psoriasis of 1.5%, based on observed prevalence rates in western countries of 2–3% [2, 3, 15–18], a psoriasis patient population of 86 170 was assumed in Switzerland.

To extrapolate costs, we used the relative distribution of the categories of psoriasis severity, gained from the patient survey, namely 38% mild, 43% moderate and 19% severe psoriasis (table 4, left half). For comparison, we repeated the same calculation with the often-cited distribution by Crown et al. [19], with 79% of patients indicating mild, 12% moderate and 9% severe psoriasis (table 4, right half).

Costs per patient increase considerably with the degree of disease severity. Specifically, total costs per patient per year double from CHF 1800

in mild psoriasis to CHF 3600 in moderate psoriasis and increase exponentially to between CHF 17 000 and 20 000 in severe psoriasis. Costs per severe patient vary with changes in prevalence rate, as the costs of inpatient care were exclusively assigned to severe psoriasis as described above.

The total direct cost of psoriasis in Switzerland is approximately CHF 314 to 458 million per year (cost basis year 2005), depending on the severity distribution pattern used for the analysis and considering out-of-pocket expenses, as well as costs for ambulatory and inpatient care (table 4).

**Table 3**

Costs of ambulatory care per patient per year according to state of severity.

State of severity	Mild		Moderate		Severe	
Cost category	Mean costs [CHF]	Valid N	Mean costs [CHF]	Valid N	Mean costs [CHF]	Valid N
Prescribed drugs	720	(n = 38)	1679	(n = 74)	8466	(n = 58)
Medical services	416	(n = 38)	813	(n = 74)	1413	(n = 58)
Total ambulatory care	1136	(n = 38)	2492	(n = 74)	9878	(n = 58)

**Table 4**

Total costs across all categories of severity in Switzerland.

	Estimated prevalence rate 1.5%, distribution along patients' indication:			Estimated prevalence rate 1.5%, costs calculated with commonly assumed severity grades:		
	Mild	Moderate	Severe	Mild	Moderate	Severe
	38% n = 32534	43% n = 36930	19% n = 16706	79% n = 68074	12% n = 10134	9% n = 7962
Drugs	1 387 674	1 820 325	5 518 079	2 903 608	499 517	2 629 969
Skin care products	4 377 296	7 967 522	5 315 580	9 159 175	2 186 376	2 533 456
Bathing therapy	8 410 832	20 362 590	14 838 861	17 599 058	5 587 720	7 072 342
Other measures	6 358 743	11 279 546	15 130 220	13 305 211	3 095 232	7 211 206
Total out-of-pocket expenses	20 534 544	41 429 982	40 802 739	42 967 051	11 368 845	19 446 973
Prescribed drugs	23 434 898	61 989 812	143 585 475	49 035 831	17 010 689	69 561 871
Medical services	13 534 424	30 021 815	23 599 665	28 319 804	8 238 318	11 247 825
Total costs for ambulatory care	36 969 321	92 011 626	167 185 140	77 355 635	25 249 007	80 809 696
Total costs for inpatient care			59 584 983			59 584 983
Total costs by state of severity	57 503 865	133 441 608	267 572 862	120 322 686	36 617 851	159 841 652
Total costs of moderate to severe psoriasis			401 014 470			196 459 504
Total costs across all states of severity			458 518 335			316 782 190
Total costs per patient and severity	1768	3613	16017	1768	3613	20076

## Discussion

The aim of this study was to estimate the cost-of-illness for patients with psoriasis in Switzerland, from both a societal and individual perspective. In addition to the socioeconomic impact of psoriasis for the whole society, the disease imposes a high financial burden on the patients themselves. To obtain data on out-of-pocket expenses and costs of outpatient/office-based care, surveys were distributed to members of the Swiss Psoriasis and Vitiligo Society (SPVG), and office-/hospital-based Swiss dermatologists, respectively. Additional inpatient costs were calculated on the basis of data obtained from the Federal Statistical Of-

fice (FSO) regarding the number of cases treated for psoriasis in hospital and the average length of hospital stay.

Cost-of-illness studies are a well-recognized tool to show the financial burden of diseases in a particular country and to identify subgroups for which the costs are particularly high. Regardless of the specific health system, cost-of-illness studies on psoriasis previously performed indicate considerable economic consequences in countries such as the UK [1], Italy [3], the USA [4], Australia [5], and Germany [7-9]. These studies have shown that the costs for psoriasis patients depend

on disease severity, with higher costs in the more severe cases. For this reason, the resulting empirically derived cost estimates for psoriasis extrapolated to the total adult population of Switzerland was of particular interest for patients with moderate-to-severe psoriasis. One of the distinguishing characteristics of this study is that it is the first to present total psoriasis-related costs on a patient-covered out-of-pocket basis and in an outpatient setting.

In the US, the 1998 National Psoriasis Foundation patient-membership survey identified that 40% of psoriasis patients suffer from severe psoriasis [20], resulting in a prevalence of severe psoriasis of 0.8% in the general population. However in a population-based study, the prevalence of severe psoriasis was found to be ten times less (0.06% of the general population) [21]. Our calculated results were in the range between these two publications, with a prevalence of 0.77% for moderate to severe psoriasis. The proportion of patients with moderate (42%) or severe psoriasis (19%), found here, differs somewhat from the numbers of other surveys where only 21% of all patients suffered from moderate to severe psoriasis [7, 22]. Based on those quoted numbers, an estimated 79% of patients would have mild psoriasis, 12% moderate and 9% severe psoriasis. Our distribution might therefore not be representative for the general population. Our sample was composed of patient members of the SPVG and patients treated in dermatologic practices. Both groups might be skewed towards higher severity of psoriasis. In addition, the patients' own estimation of affected body surface might be incorrect, however we believe this to be unlikely, because relative accuracy of patients' estimations with a much more complicated instrument (SAPASI) has been described [23]. To obtain a sound estimate of costs, we used both severity pattern distributions (table 4) for the calculations, reaching comparable total cost within a range of 31% (CHF 314–458 million). We found a relationship between the patient-reported effect of psoriasis on quality of life and the severity of disease, as represented by the body surface area affected. The finding is not unexpected, as it corresponds to a recently published report [9].

Potential limitations of this study include the rather low response rate of 32%. It is possible that the patients with a greater quality of life impairment responded to a larger extent than other patients, which is comparable to the literature [14, 24, 25]. The accuracy of patient's out-of-pocket expenses over the past 12 months might be decreased by possible recall bias. In addition, personal expenses on certain products, such as skin care products and dietary supplements probably correlate with income. Use of such products does not necessarily reflect the patient's current disease status, but may merely reflect personal habits. As this study included only patients who are in the SPVG or receiving treatment by a dermatologist, both with presumably a relatively high loss of

quality of life, the proportion of patients that treat their psoriasis minimally was possibly not included. In addition, patients organized in patients groups are likely to spend more money on their illness. The issue of missing data and the need to make some assumptions is of general concern in any questionnaire-based survey. This was addressed by attempting to make only assumptions likely to lead to an underestimate of costs, rather than an overestimate, such as assuming the use of the smallest package size if information on package size was missing. Regarding the cost of hospitalized patients, we could not differentiate whether all patients were in the hospital for their psoriasis or had psoriasis as a secondary diagnosis. Therefore, the real cost generated for the treatment of psoriasis in the hospital setting might be somewhat lower.

Despite these limitations, the estimate provided by this study offers an approximation of the direct costs associated with psoriasis in Switzerland. The results obtained were comparable to the results from former studies in other countries [6–8]. In Germany, costs for inpatient treatment are estimated at approximately EUR 160 million (CHF 239 million) [10] per year, compared to EUR 39 million (CHF 59 million) in Switzerland. This result is in line with the difference in population and higher Swiss hospital costs. Regarding annual severity-related costs, one German study reported costs of EUR 2866 (CHF 4281) per patient and year for moderate psoriasis, and EUR 4985 (CHF 7447) for severe psoriasis [7]. Another study estimated mean total costs as EUR 6709 (CHF 10000) per patient and year [8]. The corresponding costs in Switzerland amount to approximately EUR 2410 (CHF 3600) per patient per year for moderate psoriasis to approximately EUR 12000 (CHF 16000–20000) for severe psoriasis.

The results of the present study indicate that the total burden of psoriasis in Switzerland amounts to approximately CHF 312–458 million per year (cost basis year 2005). This represents between 0.6–1.1% of total direct health care expenditures in 2005 in Switzerland. Although the estimated total direct costs for psoriasis amount to approximately 1% of total health care expenditures in Switzerland, these costs are incurred by a relatively small group of patients (1–2% of total population).

In conclusion, the present study indicates that psoriasis imposes a substantial economic burden on Swiss society, the health insurance system, and the affected individuals themselves. The Swiss health insurance system is confronted with high direct in- and outpatient treatment costs of CHF 312–458 million per year. Moderate-to-severe psoriasis is associated with a significant impact on quality of life and important costs, indicating a need for efficient control of the disease. This cost-of-illness study provides specific health economic data for future healthcare decision making, particularly with the advent of new therapeutic agents that require economic assessment.

*Correspondence:*  
*Ralph M. Trüeb*  
*Department of Dermatology*  
*University of Zurich*  
*CH-8091 Zurich*  
*Switzerland*  
*E-Mail: ralph.trueeb@usz.ch*

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